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April 1960

PUBLICATIONS AND PATENTS

of the

NORTHERN UTILIZATION RESEARCH AND DEVELOPMENT DIVISION
Peoria, Illinois, for the period
JULY - DECEMBER 1959

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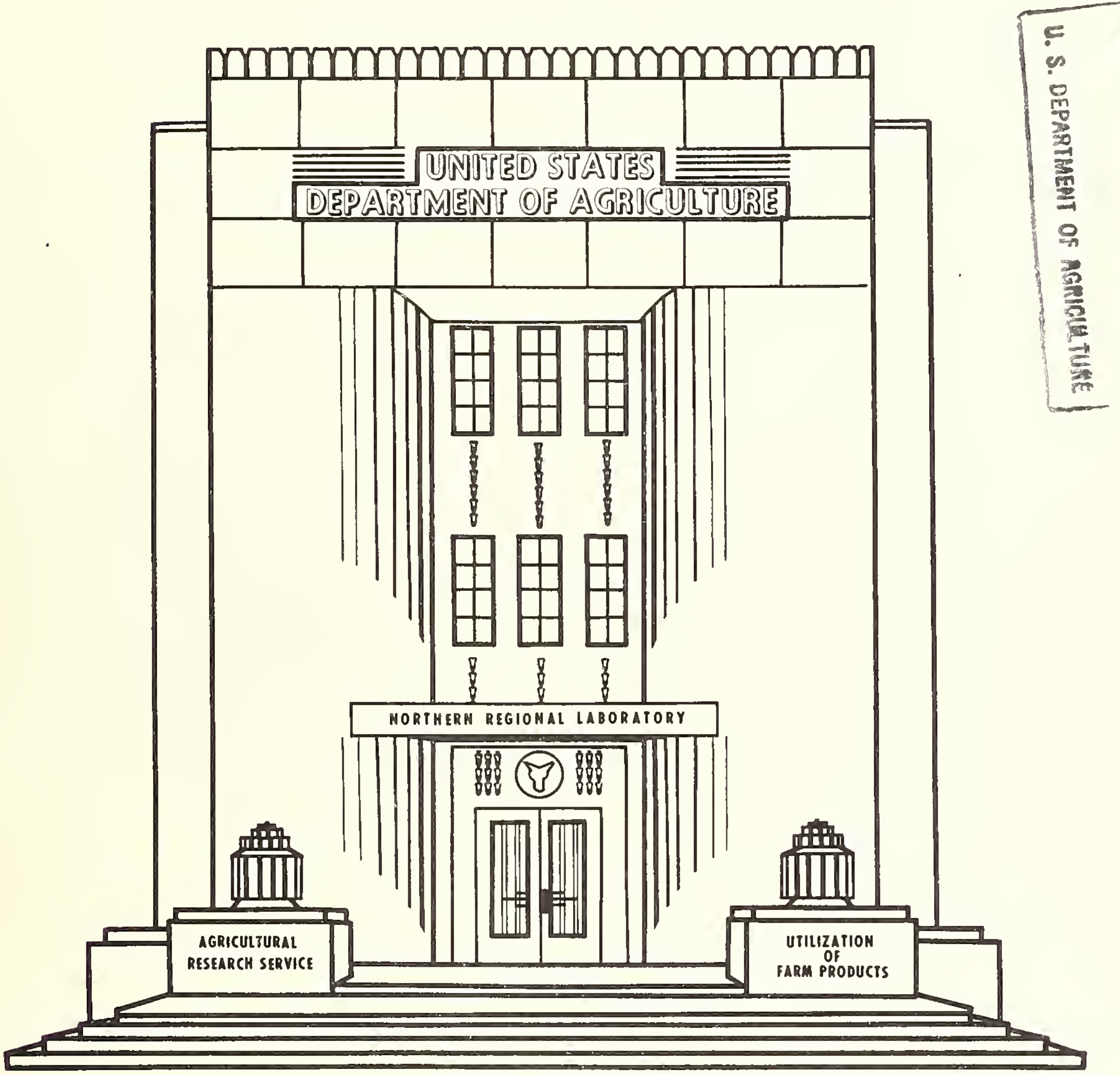
UNITED STATES
DEPARTMENT OF AGRICULTURE
NORTHERN REGIONAL LABORATORY
AGRICULTURAL RESEARCH SERVICE
UTILIZATION OF FARM PRODUCTS

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Congress in 1938 authorized four regional laboratories to conduct basic and applied research designed to expand, improve, and develop through science and technology the utilization of American farm crops. Agricultural products assigned the Northern Division for study are: *The cereal grains*--corn, wheat, grain sorghum, and oats; *the oilseeds*--soybean, flaxseed, safflower, and erucic acid-containing oilseeds; and *new crops* screening. The abstracts in this list describe current research activities and indicate progress achieved by the Northern Division.

Northern Division publications are available, in conformance with United States Department of Agriculture policy, to scientists and other specialists, librarians, representatives of the press, and other individuals and organizations. Titles of publications no longer available are marked with an asterisk (*).

One copy each of 10 publications may be sent in response to specific requests. Please address: Publications, Northern Utilization Research and Development Division, 1815 North University, Peoria, Illinois.

Most of the publications are reprints of articles published in journals that are available in libraries. Any one who needs information may obtain it most efficiently by consulting a technical library. Photographic copies of most journal articles on research at this Division can be purchased from the Library of the U. S. Department of Agriculture, Washington 25, D. C.

No publications will be sent regularly in response to foreign requests unless exchange arrangements have been made with: Director, Library of the Department of Agriculture, Washington 25, D. C.

Printed copies of patents, which are assigned to the Secretary of Agriculture, can be obtained only by purchase (25 cents each) from the Commissioner of Patents, U. S. Patent Office, Washington 25, D. C. Order by number, do not send stamps.

Previous lists of publications and patents were issued as NM-305, AIC-187, and AIC-318, with supplements. Copies of these lists are available on request.

July - December 1959

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PUBLICATIONS

[Publications marked (*) are not available for distribution.]

DEVICE TO ESTABLISH DRYING CONDITIONS FOR PROTECTIVE COATINGS AT ELEVATED TEMPERATURES.

A. W. Schwab, H. M. Teeter, and J. C. Cowan.
J. Am. Oil Chemists' Soc. 36(7): 275-277. July 1959.
Republication: Am. Paint J. 44: 96, 98-99, 102-103, 105-106. December 1959.
Fed. Soc. for Paint Tech. Off. Dig. 32(422): 351-359. March 1960.

An apparatus is described for determining the drying time of protective coatings on metal discs at temperatures up to 260° C. The discs are placed on turntables that make one revolution every 15 minutes while a spiral sand track is laid down upon the film. "Tack-free" time and "set-to-touch" time are determined by the usual method of removing sand from the disc. Three turntables permit simultaneous evaluation of three films. Reproducible results have been obtained, and uniform conditions appear to prevail throughout the apparatus. Examples are given for drying times of coatings derived from polyunsaturated fatty vinyl ether polymers.

AGRICULTURAL RESIDUES AS RAW MATERIALS FOR VISCOSE-GRADE PULP.

T. R. Naffziger, R. S. Matuszewski, G. H. Nelson, and T. F. Clark.
TAPPI. 42(7): 609-612. July 1959.

Six agricultural residues were used as raw materials for experimental production of viscose-grade pulp. All materials were subjected to the same single set of processing conditions in laboratory-scale operations. Yields and chemical characteristics are reported for these experimental pulps, prepared by the prehydrolysis-sulphate pulping process followed by a multistage bleach. Test values for pulps from wheat straw, corn stover fiber, and bagasse fiber compared favorably with those of six dissolving pulps produced commercially from both hard and softwoods.

RAPID COLORIMETRIC METHOD FOR DETERMINING GLYOXAL.

C. S. Wise, C. L. Mehltretter, and J. W. Van Cleve.
Anal. Chem. 31(7): 1241-1242. July 1959.

A rapid and selective spectrophotometric method for determining glyoxal in the presence of reducing sugars has been developed for use in studies on the production of glyoxal by hydrolysis of periodate oxidized starch. The method is an extension of the work of Wanzlick and Löchel, who showed that 1,1'-3,3'-tetraphenyl-2,2'-biimidazolidine, formed by reaction of glyoxal with dianilinoethane, produces a blue color upon heating with hydrochloric acid. A small aliquot containing about 1.2 mg. of glyoxal is heated for 30 minutes with an alcoholic acid solution of dianilinoethane. After dilution to 100 ml. the absorbance is measured at 550 mμ and is constant for at least 2 days. Formaldehyde, acetaldehyde, glucose, and erythrose do not interfere in the analysis.

USDA SCIENTISTS REPORT ACTIVE PROGRESS IN NEW CROPS RESEARCH.

Ivan A. Wolff and Quentin Jones.[1] [1](USDA Crops Research Division, Beltsville, Md.)
Chemurgic Dig. 18(7): 3-11. July 1959.

The new crops screening program of the Agricultural Research Service--its need, opportunities, and proposed manner of operation--was described in the Chemurgic Dig. 17(9): 4-8, September 1948 This second publication relates in nontechnical language the implementation of this research by screening more than 1,000 seed samples for valuable oil and protein constituents and over 100 stalk samples for their possible utility as raw materials for pulping. Some promising leads are described including the unique and potentially valuable seed oil of the cape marigold, which was shown to contain a new reactive fatty acid as a major component.

RETROSPECTIONS ON STREPTOMYCETE TAXONOMY.

Thomas G. Pridham.
Revista Latinoamericana de Microbiologia, Sup. 3: 1-22. July 1959.

The history of actinomycete classification is reviewed in general. Similarities and dissimilarities of the various systems are pointed out, and the systems are also evaluated in terms of present knowledge. New approaches are discussed including recent work on morphology of sporophores, electron microscopy of spores, cell-wall composition, carbon- and nitrogen-utilization reactions, serology, phage sensitivity, and antibiotic sensitivity. Views on how to establish a logical order in streptomycete classification are presented and means to attain this goal are suggested.

SEARCH FOR NEW INDUSTRIAL OILS. I. SELECTED OILS FROM 24 PLANT FAMILIES.

F. R. Earle, E. H. Melvin, L. H. Mason, C. H. Van Etten, I. A. Wolff, and Q. Jones.[1]
[1](USDA Crops Research Division, Beltsville, Md.)
J. Am. Oil Chemists' Soc. 36(7): 304-307. July 1959.

A comprehensive search has been initiated to discover new or little-known plant materials that might have potential industrial use, but which are not now grown commercially in this country. Out of 621 samples of seeds, 119 were found to contain more than 20% oil. These samples include 92 plant species, and 24 families. Oils from 86 species were extracted and examined for iodine value, saponification value, refractive index, hydroxyl, oxirane oxygen, linoleic and linolenic acids, and ultraviolet and infrared absorption. Preliminary gas chromatographic analyses were carried out on about half the oils. Data on 42 species (not all of them new) are included in this initial report.

PROGRESS IN RESEARCH ON WHEAT GLUTEN PROTEINS.

R. J. Dimler and F. R. Senti.
Bakers Dig. 33(4): 34-39. August 1959.

For the first time individual proteins or groups of electrophoretically similar proteins have been both detected and separated from wheat gluten. Improved conditions for the moving boundary electrophoresis of gluten showed the presence of a minimum of six components and made possible the use of electrophoresis as an analytical tool in following the separation of the components. Four electrophoretic components have been separated by column chromatography and will be studied further. This research is providing fundamental information on gluten of value in the search for increased industrial outlets for wheat and also is applicable to other areas of research, such as baking studies.

NEW LOW-COST SEQUESTRANTS.

C. L. Mehltretter and P. R. Watson.
Soap and Chem. Spec. 35(8): 49-50, 106. August 1959.

Mixtures of organic acids produced by oxidizing dextrose hydrate and corn starch with nitric acid are rich in gluconic and saccharic acids and possibly contain other chelating substances. Such oxidation liquors were evaluated for their sequestering action toward calcium, aluminum, and ferric ions in alkaline solution. Good sequestration was obtained with liquors in which 1 mole of carbohydrate had been oxidized with 2 to 4 moles of nitric acid.

GLYCERIDE STRUCTURE OF VEGETABLE OILS BY COUNTERCURRENT DISTRIBUTION.
IV. COCOA BUTTER.

C. R. Scholfield and H. J. Dutton.
J. Am. Oil Chemists' Soc. 36(8): 325-328. August 1959.

Cocoa butter has been fractionated by countercurrent distribution between pentane-hexane and furfural-nitroethane solvent phases with the application of 1,100 transfer stages. Except for a small percentage of trisaturates and linoleic acid-containing triglycerides, oleic acid occurs at least once in each glyceride molecule. Cocoa butter is composed principally of mono-oleins: oleodistearin, 22%; oleopalmitostearin, 41%; and oleodipalmitin, 12%. Whereas the latter glyceride is not permitted under a pure even pattern, the low trisaturate content is not consistent with a random pattern. Cocoa butter follows neither a random nor an even pattern of glyceride structure.

FEED UTILIZATION RESEARCH.

L. L. McKinney.
Feedstuffs. 31(32): 44-45, 48, 50, 52, 54, 56. August 1959.

Feed utilization research conducted since the Northern Regional Laboratory was built in 1941 is reviewed. A bibliography of publications on this research involving cereal grains--corn, sorghum, oats, and barley--and soybean and linseed oil meals is given. Trends in feed utilization and their effect on future research are also considered. Included are studies on proximate composition and structure, proteins and amino acids, vitamins and minor constituents, fermentative production of antibiotics, and processing.

LINOLEIC ACID FROM SAFFLOWER OIL BY LIQUID-LIQUID EXTRACTION.

R. E. Beal and O. L. Brekke.
J. Am. Oil Chemists' Soc. 36(9): 397-400. September 1959.

A pilot-plant study was conducted to determine the purity and yield of linoleic acid obtained by liquid-liquid extraction of fatty acids derived from safflower oil. Furfural was employed as the selective solvent, and hexane as a secondary solvent to produce a two-phase system. Tests were made in a centrifugal extractor with center feed of fatty acids. Operating factors evaluated include: Temperature of feed and product streams, solvent ratio, total throughput, water content of solvent, and type of fatty acid feed. Under optimum conditions a product containing about 95% linoleic acid was obtained as a solvent-solute ratio (weight basis) of 15.

SLAVE RECORDER FOR AN INFRARED SPECTROPHOTOMETER.

Curtis A. Glass, Lloyd R. Bair, and Eugene H. Melvin.
Rev. of Sci. Instruments. 30(9): 835-836. September 1959.

A simple, mechanical, slave recorder is described which will operate on an infrared spectrophotometer by mechanical motion entirely and will produce a smaller record on a 5 X 8-inch file card. The wave length is obtained by recording on a smaller drum rigidly attached to the existing one, and the transmission motion is obtained from a cam fixed to the top of the existing pen-drive cable sheaves.

THE BREAD STALING PROBLEM. X-RAY DIFFRACTION STUDIES ON BREADS CONTAINING A CROSS-LINKED STARCH AND A HEAT-STABLE AMYLASE.

H. F. Zobel and F. R. Senti.
Cereal Chem. 36(5): 441-451. September 1959.

An investigation was made of the relationship between crumb firmness and starch crystallization of breads baked with reconstituted flours containing 40% of a cross-linked starch and supplemented with a heat-stable bacterial amylase. X-ray patterns showed that up to 3 or 4 days after baking, the experimental breads were more crystalline than a conventional bread. Extensive starch crystallization in amylase-supplemented bread was not paralleled, however, by a corresponding increase in crumb firmness. A breakdown of the crystalline amorphous network resulting from amylase activity can account for the lack of firmness in bread of high-starch crystallinity.

OILSEED UTILIZATION RESEARCH.

J. C. Cowan.
Chemurgic Dig. 18(9): 8-13. September 1959.

Noteworthy contributions to oilseed utilization made by the Northern Regional Research Laboratory on assigned oilseed commodities are reviewed. These include significant additions that have been made to fundamental science on the composition, physical properties, chemical reactions, and interactions of oilseed constituents. Short discussions are also given on the present and future research program on oilseeds.

OBSERVATIONS ON THE POTENTIOMETRIC TITRATION OF SULFHYDRYL GROUPS IN WHEAT GLUTEN WITH IODINE.

W. C. Schaefer, C. A. Wilham, R. J. Dimler, and F. R. Senti.
Cereal Chem. 36(5): 431-441. September 1959.

The method provides a titration medium, in which gluten is soluble, and offers the advantage of electrometric detection of end point. Standard deviation was 5.4% of the average titer. Glutens from a variety of sources were found to contain from 6.4 to 9.8 microequivalents of sulfhydryl per gram of protein, although there is some question whether iodimetric titration provides an absolute measure of sulfhydryl groups.

JAPANESE SCIENTISTS LOOK AT U. S. SOYBEANS.

Tokuji Watanabe and Kazuo Shibasaki.
Soybean Dig. 19(11): 66-68. September 1959.

Many phases of soybean production and utilization in the United States were investigated, and a better understanding was obtained of the problem of using U. S. soybeans in tofu and miso. The research work indicates the possibility that some U. S. varieties may be satisfactory for making tofu. A new procedure of making miso from dehulled grits was developed, but further research is needed to extend the use of U. S. soybeans in Japan.

RESEARCH ON THE INCREASING USE OF U. S. SOYBEANS IN JAPAN.

Allan K. Smith.
Soybean Dig. 19(11): 62-65. September 1959.

The problems of using soybeans from the United States for Japanese traditional foods are described, and the objective of research intended to eliminate the criticism is reviewed. Analytical data are presented on the protein and oil content of U. S. and Japanese soybeans. It is shown that there is little, if any, difference in average protein content of beans from the two countries, but U. S. soybeans contain over 3.0% more oil. The relative protein values of beans from the two countries are discussed.

REACTIONS OF DIENOPHILES WITH VEGETABLE OILS. I. REACTIONS OF MALEIC ESTERS WITH SULFUR DIOXIDE CATALYST.

W. R. Miller, E. W. Bell, J. C. Cowan, and H. M. Teeter.
J. Am. Oil Chemists' Soc. 36(9): 394-397. September 1959.

Direct reactions of dibutyl and dimethyl maleate with safflower oil were investigated. When transformed into esters and distilled, the products are generally different from the Diels-Alder adducts obtained from *trans,trans*-9,11-linoleic acid. The differences most probably result from the formation of one or more isomers of the known product, of the substituted succinate, of a transannular lactone, or of a mixture of these and other isomers. Reactions are best carried out by heating safflower oil to 290° C. while sweeping it with sulfur dioxide. The maleic ester is then added dropwise, and the product is transesterified and distilled. By this procedure a distillable adduct fraction is obtained in yields up to 70%, based on linoleate. Fumaric esters give similar results. Omission of the sulfur dioxide catalyst greatly reduces the yield.

CONSISTENCY MEASUREMENTS ON BATTERS, DOUGHS, AND PASTES.

E. B. Lancaster and R. A. Anderson.
Cereal Chem. 36(5): 420-430. September 1959.

A consistency-recording apparatus, made from a variable voltage transformer and a recording differential ammeter, has been used with various mixers to investigate some mixing properties of a variety of batters, doughs, and pastes over an extremely wide consistency range. Curves obtained when flour-water batters were tested have proved valuable in predicting the proper water-flour ratio needed to carry out the continuous batter process for fractionating wheat flour. Also from these curves, it was possible to establish a relationship between the protein content of the flour and the consistency of the batter. The relationship, based on 41 observations, has a correlation coefficient of 0.97, and a standard error of estimate of 0.104, in terms of consistency. The operating range of the apparatus was demonstrated on cake-mix batters, starch-water mixtures, and doughs prepared from dried gluten and soft wheat flour.

CURVULARIN FORMATION BY *PENICILLIUM STECKII*.

D. Fennell, K. B. Raper, and F. H. Stodola.
Chem. and Ind. (London) (44): 1382-1383. October 1959.

Penicillium steckii has been found to produce curvularin, a $C_{16}H_{20}O_5$ compound recently reported by Musgrave as a product of a *Curvularia* species.

RECENT PROGRESS IN SOYBEAN UTILIZATION RESEARCH.

J. C. Cowan and W. C. Witham.
Soybean Dig. 19(12): 14-15. October 1959.

Progress in soybean utilization research at the Northern Regional Laboratory is summarized under soybean oil stability, aldehyde oils, vinyl ethers of soybean fatty alcohols, components of soybean oil meal, and use of U. S. soybeans in Japanese foods. Recent studies on the chemical changes involved have given a better understanding of the problems in stabilizing soybean oil. A team effort on vinyl ethers of fatty alcohols has shown that 2 of over 200 or more copolymers studied have properties suitable for continued developmental studies. Evidence for the presence of 13 different protein components in the water extract of raw soybean meal confirms the complexity of this product.

RESEARCH METHODS OF ANALYSIS OF DRYING OILS.

Herbert J. Dutton.
J. Am. Oil Chemists' Soc. 36(10): 513-518. October 1959.

This review of special methods of analysis applicable to drying oils includes a discussion of fractionating methods, such as countercurrent distribution, chromatography, and inclusion complexes. The review also presents characterization methods, such as mass, infrared, ultraviolet, and nuclear magnetic spectroscopy.

EFFECT OF ANTIOXIDANTS AND METAL INACTIVATORS IN TOCOPHEROL-FREE SOYBEAN OIL.

E. N. Frankel, P. M. Cooney, H. A. Moser, J. C. Cowan, and C. D. Evans.
Fette·Seifen·Anstrichmittel 61(10): 1036-1039. October 1959.

A partial stripping of the tocopherol level of soybean oil (from 1500 γ/gram to 500 γ/gram) with carbon-black resulted in a marked improvement in oxidative stability, but in only a possible improvement in flavor stability. Commercial antioxidants did not improve the oxidative and flavor stability of tocopherol-stripped soybean oil. The lack of activity of antioxidants is attributed to the highly unsaturated fatty acid composition of this oil.

AUTOXIDATION IN AQUEOUS CAROTENE-LINOLEATE SYSTEMS.

R. L. Lohmar and Harvey L. Tookey.
Arch. Biochem. Biophys. 84(2): 297-304. October 1959.

Autoxidation of carotene and linoleate in aqueous buffer was compared with the enzymic-coupled oxidation. In contrast to the enzymic system, where maximum rates were observed at the critical micella concentration (CMC) of linoleate, a minimum in carotene destruction was found in autoxidation. Below CMC, prolonged induction periods were observed. Increasing the carotene at high linoleate levels speeded the oxidations.

At high linoleate levels, spectral absorption of carotene in the aqueous system was similar to that in organic solvents, but as linoleate approached the CMC, the position of maximum absorbance was displaced toward shorter wave lengths. This maximum shifted toward longer wave lengths with time. It is concluded that the physical state of soap in solution has a profound effect on carotene spectra and upon autoxidation.

ELECTROPHORESIS AND FRACTIONATION OF WHEAT GLUTEN.

R. W. Jones, N. W. Taylor, and F. R. Senti.
Arch. Biochem. Biophys. 84(2): 363-376. October 1959.

Electrophoretic patterns of wheat gluten previously reported in the literature are asymmetric with respect to the ascending and descending boundaries. Several suitable buffer systems were found that gave symmetrical diagrams, thus aiding in establishing the number of components in gluten and their relative concentrations. The best studied, aluminum lactate-lactic acid at pH 3 and nominal ionic strength of 0.1, resolved gluten into four components representing, in order of decreasing mobility, relative concentrations among themselves of 66, 15, 16, and 3%. In some other buffers the leading peak was resolved into two definite components. A partial fractionation of the electrophoretic components was obtained.

HIGH-AMYLOSE CORN--PROPERTIES AND PROSPECTS.

F. R. Senti and R. J. Dimler.
Food Tech. 13(11): 663-667. November 1959.

Corn having starch with more than the normal content of about 27% of amylose is a possible source of a new type of starch. The progress and present status of the development of high-amylose corn and studies on high-amylose starch are reviewed. In a cooperative program between plant breeders and chemists, analyses on breeding samples of corn indicated genetic increases of amylose up to 82% in the starch. About 10,000 bushels of corn having starch of 50 to 60% amylose content were produced under contract in 1958 and were processed commercially. Potential industrial uses of high-amylose starches are discussed in the light of the properties and molecular structure of amylose and amylopectin--the linear and branched molecular components, respectively, of starch.

ANTIBIOTICS AGAINST PLANT DISEASE. V. ACTIVITY OF CINNAMYCIN AGAINST SELECTED MICROORGANISMS.

Lloyd A. Lindenfelser, Thomas G. Pridham, and Carolyn E. Kemp.
Antibiotics & Chemotherapy 9(11): 690-695. November 1959.

Cinnamycin, a polypeptide antibiotic produced by *Streptomyces cinnamomeus* forma *cinnamomeus* (Benedict *et al.*) Pridham *et al.* NRRL B-1285, was tested in the laboratory against a wide variety of saprophytic and phytopathogenic bacteria and molds. Thirty-nine bacteria, 36 molds, and 2 yeasts were used as test organisms. Cinnamycin, in concentrations of less than 100 μg/ml, is effective against some phytopathogenic bacteria and molds. The antimicrobial spectra of cinnamycin and duramycin are compared.

THERMAL DECOMPOSITION OF DI-*n*-BUTYL MALEATE.

William R. Miller and H. M. Teeter.
J. Org. Chem. 24(11): 1816-1817. November 1959.

When di-*n*-butyl maleate is heated to its boiling point (about 265° C.) or when distillation at atmospheric pressure is attempted, the ester decomposes with evolution of *n*-butanol, 1-butene, carbon dioxide, and a tarry residue. All products obtained from this residue are polymeric viscous oils or solids. The molar ratio of butanol to butene is 2 to 1, with a maximum of about 1 mole of butanol formed for each mole of ester. Carbon dioxide formed is less than the butanol but more than the butene. Whether the ester is prepared with or without sulfuric acid catalyst has no effect on the decomposition. Di-*n*-butyl fumarate decomposes in a similar although not identical manner. The obvious mechanism for this decomposition is not supported by the observed data.

A NOTE ON THE EFFECTS OF NEUTRAL POLYSACCHARIDES ON DOUGH MIXING PROPERTIES.

C. A. Wilham, R. J. Dimler, and F. R. Senti.

Cereal Chem. 36(6): 558-563. November 1959.

Farinograph data indicate that a new type of flour-polysaccharide interaction occurs when the neutral polysaccharide dextran is admixed at low concentration with 70% extraction flours. The extent and mode of this interaction depend on the molecular structure and/or size of the dextran. Certain types of high molecular weight dextrans produce a deleterious effect on mixing tolerance while lower molecular weight fractions of all dextrans tested reduce the water absorption of flour without any noticeable influence on mixing tolerance. Other neutral polysaccharides, such as solubilized starches, levans, and glycogen, produce no effect on the mixing curve. Dextrans may be of use in studies of bread-staling and dough-mixing properties.

*PROGRESS IN RESEARCH ON LINSEED OIL AT THE NORTHERN REGIONAL RESEARCH LABORATORY.

J. C. Cowan.

Proc. Flax Inst. U. S., Fargo, North Dakota, November 19-20, 1959, pp. 5-7. Also presented at the Barley and Oil Seeds Conference, Winnipeg, Canada, February 26, 1960.

In the program to extend industrial utilization of major oilseeds, research on linseed oil emulsion paints was selected as of primary importance to increased use of flaxseed. The linseed oil industry is actively cooperating in planning and carrying out the work on these emulsions. In addition, cyclic fatty acids and ozone-reductive cleaving of linseed oil are being studied. Although new products for commercial use appear feasible, their utility and ability to compete on the commercial market remain to be demonstrated.

IMPROVED PROCESSING METHODS FOR FRACTIONATION OF WHEAT FLOUR AND THE MANUFACTURE OF VITAL GLUTEN.

R. A. Anderson, C. Vojnovich, V. F. Pfeifer, and E. L. Griffin, Jr.

Am. Miller and Processor 87(12): 18-21. December 1959.

Improvements have been made in the batter process for separating gluten and starch from wheat flour. Construction of a continuous pilot plant for carrying out the process has resulted in gluten recoveries of 80% or higher from a number of different types of flour. Glutens with purities up to 84% were obtained from higher grade flours, while the low-grade flours yielded gluten with a purity of about 80%. Production costs for carrying out this process are estimated at 0.26 cent per pound of flour processed to starch liquor and wet gluten.

Glutens prepared by this method have been dried by a newly developed procedure to yield a good quality vital product. Wet gluten is dispersed in dilute acid, preferably acetic, to form a suspension with a pH in the range of 4.5 to 5.1 and containing up to 20% solids, and then is fed to an atmospheric drum-drier heated with steam in the range of 20-80 p.s.i.g. The quality of gluten prepared by drum-drying compares quite favorably with that of vacuum-dried material, except where gluten from flours of high ash content are dried. Cost of producing 1 pound of dry vital gluten by the new procedure is estimated at 4 cents.

CYCLIZATION OF LINOLENIC ACID BY ALKALI ISOMERIZATION.

C. R. Scholfield and J. C. Cowan.
J. Am. Oil Chemists' Soc. 36(12): 631-635. December 1959.

Methyl linolenate was isomerized by heating in an alkaline ethylene glycol solution for 7 hours at 200°. After treating with urea in methanol and distilling, the isomerized esters consist of 81.8% distillate (NAM) and 13.7% distillable material that do not form adducts with urea, plus 4.5% of a urea adduct former.

The NAM has a maximum absorption in the ultraviolet region at 238 mμ. Although absorption extends into the region associated with triene conjugation, the characteristic structure of triene absorption is absent. Infrared absorption bands in the 10 μ region ordinarily found with *trans, trans* or *cis, trans* are also absent. The NAM was shown to contain a cyclic monomer by treatment with N-bromosuccinimide followed by dehydrobromination with dimethylaniline. The resultant product was oxidized to phthalic acid with permanganate.

CHROMATOGRAPHY OF SOYBEAN PROTEINS. I. FRACTIONATION OF WHEY PROTEINS ON DIETHYLAMINOETHYL-CELLULOSE.

Joseph J. Rackis, H. A. Sasame, R. L. Anderson, and A. K. Smith.
J. Am. Chem. Soc. 81(23): 6265-6270. December 1959.

A method for the chromatographic separation of soybean whey proteins on a cellulose ion-exchange adsorbent using both analytical and preparative isolation procedures is described. Elution by stepwise and continuous increase in the salt concentration of the eluant was used. Effluent fractions were examined for biological activity and were characterized by electrophoretic and ultracentrifugal techniques. The whey solution was fractionated into 13 electrophoretically distinct components and 8 ultracentrifuge components having s_{20w} values between 0.99S and 6.14S as compared to only 5 and 2 components resolved by conventional electrophoretic and ultracentrifuge methods, respectively. Good correlation was observed between the order of elution and the electrophoretic mobilities of the chromatographic fractions, indicating that ion-exchange had the dominant role. Two trypsin inhibitors were isolated directly from the whey and separated simultaneously from each other.

*ZEIN.

L. L. McKinney.
Encyc. of Chem. (Sup.), eds. G. L. Clark, G. G. Hawley, and W. A. Hamor,
Reinhold Publishing Corporation, New York, 1958, pp. 319-320.

The nature, composition, manufacture, and industrial uses of zein are described. Zein is that portion of the proteins in corn that is soluble in aqueous alcohol.

CONTRACT RESEARCH PUBLICATIONS

(Report of research work done by an outside agency under contract with the U. S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division of the Agricultural Research Service.)

STALING STUDIES OF BREAD MADE WITH FLOUR FRACTIONS. V. EFFECT OF A HEAT-STABLE AMYLASE AND A CROSS-LINKED STARCH.
W. G. Bechtel. American Institute of Baking, Chicago.
Cereal Chem. 36(4): 368-377. July 1959.

POSSIBLE USES OF AIR CLASSIFICATION AND IMPACT REDUCTION IN THE MILLING PROCESS.
Gordon M. Grosh, Eugene P. Farrell, and Dr. John A. Shellenberger. Kansas State University, Manhattan, Kansas.
Northwest. Miller (Milling Production Section) 262(2 Sec. 2): 1a, 4a, 6a-8a. July 1959.

POLYALLOOCIMENE.
C. S. Marvel, P. E. Kiener, and E. D. Vessel. University of Illinois, Urbana.
J. Am. Chem. Soc. 81: 4694-4697. September 1959.

PERIODATE OXYSTARCHES IN PAPER APPLICATION.
Edward J. Jones, Bette Wabers, John W. Swanson, C. L. Mehltretter, and F. R. Senti. The Institute of Paper Chemistry, Appleton, Wisconsin.
TAPPI. 42(10): 862-866. October 1959.

THE DETERMINATION OF CONJUGATED *CIS-TRANS* AND *TRANS-TRANS* METHYL OCTADECADIENOATES BY INFRARED SPECTROMETRY.
J. R. Chipault and J. M. Hawkins (Hormel Institute, University of Minnesota).
J. Am. Oil Chemists' Soc. 36(11): 535-539. November 1959.

POLYMERIZATION OF β-PINENE WITH ZIEGLER-TYPE CATALYSTS.
C. S. Marvel, James R. Hanley, Jr., and Daniel T. Longone. University of Illinois, Urbana.
J. Polymer Sci. 40: 551-555. 1959.

**ADD TO ARS-71-3, SUPPLEMENT 6

CONTRACT RESEARCH PUBLICATION

SURFACE IGNITION IN A MOTORED ENGINE.
J. C. Livengood, T. Y. Toong, T. P. Rona, C. F. Taylor, and I. A. Black. (Massachusetts Institute of Technology)
Proceedings of the Joint Conference on Combustion in Boston, Massachusetts, June 15-17, 1955. In London, October 25-27, 1955. Published by the Institution of Mechanical Engineers, London, page 235-241, 1957.

**Notice of publication received after preparation of previous issues.

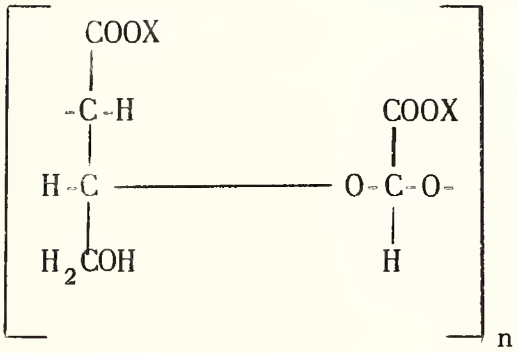
PATENTS

These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C.

DICARBOXYL STARCHES AND METHOD OF PREPARATION.

Bernard T. Hofreiter, Ivan A. Wolff, and Charles L. Mehltretter.
U. S. Patent 2,894,945. July 14, 1959.

A process for preparing dicarboxyl starch which comprises reacting dialdehyde starch with a chlorite in an aqueous acidic medium, the product being a new composition of matter of the formula



where X is a cation.

PROCESS FOR PREPARING HYDROXYALKYLATED CEREAL FLOUR.

John C. Rankin and Charles L. Mehltretter.
U. S. Patent 2,900,268. August 18, 1959.

The invention concerns the production of hydroxyalkylated cereal flour by reaction of flour with an alkylene oxide, preferably ethylene oxide. The products are useful for sizing of textiles, as adhesives, etc.

COATING COMPOSITIONS.

John C. Cowan and Howard M. Teeter.
U. S. Patent 2,901,469. August 25, 1959.

Vinyl ethers of unsaturated fatty alcohols, such as soybean alcohols, are described. Polymerization of these fatty vinyl ethers with ionic catalysts yields viscous oils that produce protective coating films when mixed with metallic dryers and dried at room temperature or by baking. Properly prepared films are very resistant to alkali.

ADDITION PRODUCTS OF FATTY ACIDS AND UNSATURATED NITRO COMPOUNDS.

Howard M. Teeter, Morris J. Danzig, and J. C. Cowan.
U. S. Patent 2,901,495. August 25, 1959.

Addition products of conjugated fatty acids, e.g., 9,11-octadecadienoic acid or conjugated fatty acids of soybean oil, and nitroolefins, e.g., nitroethylene or β-nitro styrene are claimed. These addition products are useful intermediates in the synthesis of synthetic resins, plasticizers, etc.

PRODUCTION OF DEXTRAN.

Edward J. Hehre, Henry M. Tsuchiya, Nison N. Hellman, and Frederic R. Senti.
U. S. Patent 2,906,669. September 29, 1959.

Dextran is synthesized by the action of *Streptococcus*, sp. NRRL B-1351 in a medium containing sucrose and a source of assimilable nitrogen. This organism is peculiar in producing practical yields of a dextran product having a molecular weight in the range intermediate between inactive dextran and sucrodextran.

Similar lists of publication abstracts and patents are available from the other three Regional Utilization Research and Development Divisions of the Agricultural Research Service, U. S. Department of Agriculture. The addresses and fields of research covered are:

Division	Principal Fields of Research
Eastern Utilization Research and Development Division 600 East Mermaid Lane Philadelphia 18, Pennsylvania	Eastern deciduous fruits; Eastern vegetables; meat; dairy products; animal fats; hides, tanning materials, and leather; honey; maple products; tobacco; allergens of agricultural products; and new crops.
Southern Utilization Research and Development Division Post Office Box 19687 New Orleans 19, Louisiana	Cotton, cottonseed; tung fruit; peanuts; rice; sugarcane; pine gum; citrus and other fruits; sweetpotatoes, cucumbers, and other vegetables.
Western Utilization Research and Development Division 800 Buchanan Street Albany 10, California	Western fruits, tree nuts, and vegetables; poultry products; alfalfa and other forage crops; wheat, rice, and barley; wool and mohair; sugar beets; dry beans and peas; castor and dimorphotheca; and selected new crops.